

NOTES ON THE LIFE-HISTORY OF METHOCA STYGIA
SAY.

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The Thynnidæ, a family of aculeate wasps seems to find its metropolis in Australia. There, many large and striking forms occur—in strong contrast to our own modest species and to those of Northern Europe, represented indeed by the single genus *Methoca*. The diversity between the two sexes of the same species, in our forms at least, is so great—the male comparatively large, with coarse sculpture, compact thorax and well developed wings—the female small, slender and ant-like, that one does not wonder that they were first placed in separate genera, namely *Tengyra* and *Methoca*.

The Thynnidæ have several points in common with their generally hirsute relatives, the Mutillidæ, as for example, the apterous condition and ant-like appearance of the female, her long curved sting, hardness of body, and the habit of the male of carrying his mate about in his mandibles, a procedure possible in the Mutillidæ however only where the male is much larger than the female and capable therefore of flying about with her.

I was prompted by the researches of Adlerz ('03, '05) and of the Champions ('14, '15), on the biology of *Methoca ichneumonides* Latr. of Britain, Belgium, Scandinavia, and other parts of Europe to make observations on our own New England species, *Methoca stygia* Say, and while meeting with indifferent success, I was able to note that the habits of the two species are very similar.

Like its European cogener the female varies greatly in size, the series in my collection has its smallest individual 3.75 and its largest 7 mm. long, while the Champions have found *M. ichneumonides* to vary from 4 to 9 mm. The male of *M. stygia*, Fig. 1, is about 11 mm. long and shining black, with the head and thorax coarsely punctate, and the clypeus with a prominent median tooth. The abdomen is polished and rather coarsely punctate, with the segments, particularly 1 and 2, strongly separated by well-marked constrictions, which are deepest ventrally. The end of the abdomen is armed with an upcurved ventral spine over which is a

hairy tubercle-like process. The insect is rather sparsely pubescent. The female, Figs. 3 and 5, averages about 5 mm. long and is polished and only slightly and delicately punctate. The head is blackish, or at least darker in color than the reddish to brownish black body. The thorax is long and slender and constricted into three subequal portions. The abdomen is petiolate and conic-fusiform. The legs are long and the insect nearly devoid of pubescence. Sharp states that this sex might well be taken for an ant, and this certainly hold true for our own species, which in the field superficially resembles a *Formica*, and to my mind approaches *F. schauffusi* more than any other species in the neighborhood. But *Methoca* possesses curved and not elbowed antennæ, and her conically pointed abdomen has a rapid and distinctive up and down movement. Locomotion is swift and more or less jerky and zigzag.

Prior to 1903 nothing appears to have been published concerning the biology of the genus. In July, 1903, Adlerz observed a female *M. ichneumonides* literally place itself in the open mouth of a *Cicindela* larva, which seizing her, was instantly paralyzed by a sting in the neck from the active wasp. Subsequently Adlerz witnessed this procedure many times by placing *Methocas* with *Cicindelid* larvæ in a large glass vessel containing hard-packed soil in which the larvæ had excavated their trap burrows. The activities of *Methoca* in this connection were somewhat as follows: When the tiger-beetle larva had closed the entrance to its burrow by means of its horizontally placed head and thorax, *Methoca* was seen to run around the insect and at a suitable moment place herself on this animated lid. Instantly *Cicindela* raised its head to seize the wasp in its formidible, sickle-shaped jaws, but the upward movement of the head exposed its soft neck to the immediate and paralyzing sting of *Methoca*. When her venom has taken full effect she slides down into the burrow, indulges in further stinging and malaxation, drags her prey further down, fastens her long white egg behind one of the posterior coxæ and completes her work by filling up the hole and carefully disguising its location. If the *Cicindela* larva is not at the top of the hole *Methoca* plunges boldly in and does not reappear until she fills up the burrow.¹

¹ It may be remarked here that the large spider wasp, *Pepsis formosa* of the west does not always vanquish the hairy tarantula when the latter is on the surface of the ground but kills it as well when in the depth of its burrow. Judging from the manner in which *Pepsis* plunges into hole after hole—as I have observed in western Kansas—it seems not improbable that the tragedy more commonly takes place underground.

Adlerz made a few notes on the early stages and illustrates by rather poor photographs, the *Methoca* larva and cocoon. The latter ranged in length from 8 to 18 mm., being cylindrical, brownish yellow, composed of many layers of silk, and provided above with a sort of collar or neck.

The Champions ('14, '15) have observed the habits of this *Methoca* in England, where it inhabits the heathery and sandy portions of the country. The prey is the larva of *Cicindela campestris* and *sylvatica*. They observed *Methoca* go right down the hole after her prey. The burrow is carefully filled. The wasps worked well in captivity as with Adlerz. The egg stage is about four days and the slender glassy larva matures in twenty days from oviposition. The cocoon is dirt-free.

Bridwell (1912) speaks of *Methoca californica* as being "parasitic in the burrows of tiger-beetles." Aside from this statement, I know of nothing published on the habits of any of our few species.

For three consecutive seasons (1913–1915) I have taken a few females of *Methoca stygia* in two adjoining sandy areas in Needham, a suburb of Boston, but not until the third season, when I took upwards of twenty specimens, did I attempt to secure any biological data. The locality was but a few hundred feet in extent, and its sandy and pebble-strewn soil, a favorite haunt for various fossorial wasps, as *Bembex*, *Microbembex*, *Bembidula*, *Tachytes*, *Tachysphex*, *Cerceris*, *Oxybelus*, *Mutilla* and others, was sparsely clothed with small plants, conspicuous among which was a little sedge and an inconspicuous *Hypericum*. A few small colonies of Cicindelid larvæ, probably *C. punctulata* Oliv. for the most part, undoubtedly furnished the food-supply of the *Methoca* progeny. This wasp is emphatically a lover of hot sunshine and was thus taken at rare intervals running in zigzag fashion over the sand. But once did I observe a *Methoca* attempt to enter a *Cicindelid* burrow and this attempt was failure because of the very small size of the aperture. Two *Methocas* confined in the field in glass tumblers inverted over a burrow of a Cicindelid larva yielded no results, but other experiments were in a degree successful.

In the summer of 1915 *Methoca* was comparatively abundant and twenty-six specimens were taken from August 1 to September 5, fifteen of these being captured on August 15. I confined several in a quart preserve jar half filled with sand stocked with half

grown and nearly mature *Cicindela* larvæ. The mouth of the jar was covered with fine gauze and the jar itself sunk in the soil in a sunny spot, to the level of the sand within. The wasps were fed sugar and water placed on flowers, and this appeared to prolong life, one *Methoca* living about ten days. Several of the tiger-beetle larvæ had one to several (five in one case) small, orange-colored maggots attached to the body. These were probably the larvæ of the bombyliid fly *Spogostylum*, whose life-history has been partly worked out by Shelford ('13). I was unable to watch *Methoca*, during the greater part of the time, but did notice that while they were often careful to avoid Cicindelid burrows, at other times they would enter these and make them their abode for the night, the original occupant keeping to the bottom. In the afternoon of a very warm day I emptied the jar of its contents to find two semi-paralyzed beetle larvæ each with a *Methoca* clinging to its venter busy malaxating, despite the rude unearthing. But their operations went no farther. On another occasion I observed *Methoca* putting the finishing touches to her work, in depositing grains of soil on the filled-up burrow. I obtained several eggs of the wasp. These, as also observed by the European writers, were transversely arranged in the fold behind one of the hind coxæ of the cicindelid. But one egg is laid on each larva though the latter may vary greatly in size. The cylindrical egg is nearly straight, about five times as wide as long and shining transparent whitish. None hatched though this may well be due to the unnatural conditions to which they were exposed. The victims, in some cases stung so that they soon died and decomposed, in others were nearly as active as normal larvæ. One of the *Methoca* was found decapitated a day or two after being placed in the jar. It may be well to remark that the head is very strongly attached to the thorax and indeed the whole insect is well fitted to pursue its apparently dangerous vocation. Adlerz has called attention to the shape of the metathorax which, approximately at its middle length is furrowed transversely, a place where the jaws of the cicindelid may seize her.

The male of *Methoca* seems to be much rarer than the female and is probably a visitor at flowers.

The Thynnids of Australia are often of striking appearance—a female loaned me from that region is nearly an inch long and iridescent purple and bluish.

